MTH 251 Lab
Limit Laws

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Prompts

1. Evaluate each limit. Justify each step by indicating which limit law(s) you used.

   a. $\lim\limits_{t \to 4} \sqrt{6t + 1}$

   b. $\lim\limits_{y \to 7} \dfrac{y + 3}{y - \sqrt{y + 9}}$

   c. $\lim\limits_{x \to \pi} (x \cos x)$

2. As it stands, the quotient law (of limits) cannot be used to evaluate the following limit. Explain in as much detail as possible why.
$$\lim_{h \to 0} \frac{(3 + h)^2 - 9}{h}$$

3. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step.
$$\lim_{h \to 0} \frac{(3 + h)^2 - 9}{h}$$

4. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step.
$$\lim_{h \to 0} \frac{\sqrt{3 + h} - \sqrt{3}}{h}$$

5. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step.
$$\lim_{x \to -1^+} \frac{|x + 1|}{x^2 + 4x + 3}$$

6. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step.
$$\lim_{x \to 1^-} \frac{|x - 1|}{x^2 - 4x + 3}$$

7. Evaluate the limit or show that it does not exist. Explain in as much detail as possible how to proceed from step to step. In this problem, treat x as a variable.
$$\lim_{h \to 0} \frac{\frac{2}{x + h} - \frac{2}{x}}{h}$$

8. Evaluate each limit. Justify each step by indicating which limit law(s) you used.

    a. $\lim\limits_{t \to \pi} t$

    b. $\lim\limits_{x \to 14} 23$

    c. $\lim\limits_{x \to 14} x$

9. Evaluate each limit. You will first have to manipulate the expression algebraically, then justify each step by indicating which limit law(s) you used.

    a. $\lim\limits_{x \to -4} \dfrac{x + 4}{2x^2 + 5x - 12}$

    b. $\lim\limits_{\beta \to 0} \dfrac{\sin(\beta + \pi)}{\sin \beta}$

    c. $\lim\limits_{x \to 1} \dfrac{4 \ln x + 2 \ln(x^3)}{\ln x - \ln \sqrt{x}}$